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Illustrated Lecture on
Swine in the U. S.

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UNITED STATES DEPARTMENT OF AGRICULTURE

SYLLABUS 16

Contribution from the States Relations Service, A. C. TRUE, Director
In cooperation with the Bureau of Animal Industry, A. D. MELVIN, Chief

Washington, D. C.



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ILLUSTRATED LECTURE ON SWINE IN THE UNITED STATES

By

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Bureau of Animal Industry

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U. S. DEPARTMENT OF AGRICULTURE,
STATES RELATIONS SERVICE.

A. C. TRUE, DIRECTOR.

In cooperation with the Bureau of Animal Industry, A. D. Melvin, Chief.

**SYLLABUS 16—ILLUSTRATED LECTURE ON SWINE
IN THE UNITED STATES.¹**

By WALTER B. JESSEE, B. S.,

Junior Animal Husbandman, Bureau of Animal Industry.

INTRODUCTION.

On January 1, 1915, there were 64,618,000 swine on farms in the United States, having an average value of \$9.87 per head and representing a total value of \$637,479,000. The distribution among the several sections of the country was as follows:

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Number and value of swine in different sections of the United States Jan. 1, 1915.

| Section. | Number. | Value per head. | Total value. |
|--|------------|-----------------|--------------|
| North Atlantic..... | 2,551,000 | \$13.97 | \$35,646,000 |
| South Atlantic..... | 7,074,000 | 8.01 | 56,717,000 |
| North Central east of Mississippi..... | 15,812,000 | 10.80 | 170,808,000 |
| North Central west of Mississippi..... | 22,988,000 | 10.47 | 240,860,000 |
| South Central..... | 13,467,000 | 7.79 | 105,006,000 |
| Far Western..... | 2,726,000 | 10.43 | 28,442,000 |

The total value here given is about 38 per cent less than that of the wheat crop of the United States in 1914.

The average age at which hogs are usually marketed in the United States is 11 months. The lowest average for any State is 9 months, in Maine, New Hampshire, Vermont, New York, and Michigan, while the highest is 15 months, in Louisiana.

Exports of swine in 1914 amounted to 10,122 animals, valued at \$133,751. As far as ascertainable, exports of pork and its products totaled 921,913,029 pounds during 1914, while the exports of pork lard amounted to 481,457,792 pounds.

¹ This syllabus has been prepared by direct cooperation between the Bureau of Animal Industry as regards subject matter and J. M. Stedman of the States Relations Service as regards pedagogical form. It is designed to aid farmers' institute and other extension lecturers in presenting the subject before popular audiences. The syllabus is illustrated with 53 lantern slides. The numbers in the margins of the pages refer to lantern slides as listed in the appendix.

Copy 2

CONSTRUCTION OF HOUSES.

View

- 2 No single type of hog house can be recommended that will meet all conditions. The hog house of the continuous or combination type has advantages in housing because it gives storage room for feed and bedding, saves labor, affords more protection from the cold, and permits the feeder to mix feeds and care for his hogs indoors, thus saving heat and energy that would be required to keep warm in a smaller house. In case of an outbreak of disease, sanitation is more difficult in a hog house of the continuous type.

- 4 The hog house should be so constructed that it will afford the greatest amount of light at the proper time. The windows should be placed at the proper height to secure the maximum of sunlight at farrowing time. The interior arrangement should be carefully worked out and feed and mixing rooms, scales, and watering troughs put in so that the work of feeding and handling the herd can be accomplished with the least labor possible. Except in the coldest parts of the United States, a double walled house is not needed, and a single-walled house is quite as serviceable and more economical. No house should be built that will permit an accumulation of filth and trash. Proper flooring is essential. Concrete offers a floor that can be relied upon and is permanent if properly put in. A wood or cork brick sleeping pen is needed with a concrete floor.

- 7 The hog cot or individual house has its advantages because it is easily moved from one pen or pasture to another, affords a quiet, free house to a sow and litter or to the herd boar, is cheaper to construct, and gives a good amount of air, light, and opportunity for exercise. It can be moved away from the herd in time of an outbreak of disease. In summer it can be opened and provides a shaded and cool place for the hog. A cot to be of value must usually have a floor to keep the hogs from lying on the damp ground. If the hog plant is on a well-drained dry soil, flooring may possibly be left out. If the cot is to be used for farrowing purposes, it should have a guard rail around the sides to keep the sow from lying on the young pigs. The cot can be used in early spring pastures or in fields that can not be reached from a central plant. However, a hog farm equipped solely with cots requires much more labor than one with a continuous-type house.

11 It will be seen that neither system offers ideal arrangement in itself, but a combination of the two would often seem the most judicious plan. Then the central house can be used for storing feeds and bedding, and for winter feeding, while for summer work the cots could be used to a greater extent.

PRACTICAL CONVENIENCES AND SAFETY DEVICES.

There are many devices that are simple in construction and valuable aids in managing the herd. The hurdle is valuable in driving; V-shaped trough in watering or feeding; the breeding crate in breeding; and the creep for feeding young pigs away from the sow or other older hogs. The concrete feeding floor makes a good place to feed the hogs. It saves much grain and gives the pig a chance to eat clean wholesome food. Its saving of grain will soon pay for the cost of construction, which is the only cost it has.

SANITATION AND DISEASE CONTROL.

Sanitation in the hog house, lot, and herd is no small problem. Swine are affected by many and serious diseases and parasites. Tuberculosis and cholera, lice, and mange take vast numbers of hogs and money value from swine growers each and every year. Thumps cause great loss in thrift in young pigs. Sunlight, dry clean beds, and plenty of exercise with nutritious foods are essential to a proper control or lessening of these losses. Dusty or damp sleeping quarters are especially favorable to disease infection, because they furnish a favorable place for germ life. Dipping furnishes an excellent means of controlling external parasites, and the dipping vat is an economical and convenient part of the equipment of any large piggery. The concrete dipping vat shown in view 21 is a permanent part of the equipment. Galvanized-iron vats are cheaper and easier to put up but do not last as long.

The hog louse makes pigs unthrifty, and though the actual loss due to this cause can not be estimated because it rarely kills an animal, its annoyance to the pig is an important factor in decreasing the rapidity with which gains are made. The louse is easily and effectively controlled by repeated dipping in almost any of the standard dips if they are used in strong solutions. If a vat is not available, one of the three following methods of treatment may be found to suit conditions: (1) Spraying with kerosene emulsion; (2) putting up a rubbing post filled with crude oil; or (3) putting crude oil or kerosene on the surface of the water in the pigs' wallowing vat. Mange is a serious though not so common parasite as the louse, and is best and most effectively treated by dipping.

HOG CHOLERA.

During the year ended March 31, 1913, the loss from disease of swine in the United States amounted to 110.1 per 1,000, or a total number of 6,738,283. A conservative estimate shows that the

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- View. yearly loss from cholera must amount to more than \$18,000,000. Investigations of the United States Department of Agriculture have placed the people in a position to save all or a greater part of this cholera loss. These investigations have shown that hog cholera is caused by a microorganism of such minute size that even our most powerful microscopes do not enable us to determine its form or structure. By inoculating with hog-cholera serum a greater part of this enormous loss can be prevented and swine growing be put on a safer basis. Cholera can not be cured, but the serum-inoculation method effectually prevents it. Serum is now prepared by most of the State experiment stations, and more than 1,000,000 hogs have been given protective inoculation with most satisfactory results. If hogs are not inoculated before the outbreak of cholera they should be as soon as possible after it is known. No new hog should be placed with the herd after arrival until it has been isolated at least two weeks, and in case of an outbreak of disease the unaffected hogs should be separated from the sick ones and placed in clean quarters as soon as possible. All dead hogs should be burned or buried so deeply that their carcasses will not be found by dogs, buzzards, crows, or other animals and the disease spread from them.

SELECTION OF BREEDING STOCK.

- 26 The brood sow is the first animal to select in laying a foundation for a herd. The better she is the greater the chances for success. A good brood sow must possess depth and length of body, a good heart girth, smooth shoulders, well-sprung ribs, and long, deep, well-turned hams. Her sides should be long, deep, and straight. A slightly arched, or straight, broad back is much desired, as it is much stronger than a low back. The back should carry its width and the side lines should be straight. She should stand up well on her toes and have smooth, straight joints with hard but not coarse bone, and must have feminine characteristics, which are indicated by a rather small head and ear, a fully developed, even udder, and absence of shields in the shoulders. A brood sow should show early maturing qualities and have sufficient capacity to do the work for which she is intended. A smooth coat of fine hair and a broad head with sufficient weight for her age are good indications of early maturity. If selecting more than one sow, uniformity of the lot is desirable and important. The nearer alike the sows the more probability of the pigs being uniform. If pure-bred sows are selected, breed type should be carefully

observed. "Breed type" means the characteristics of a breed, and will be discussed later. View.

In selecting the herd boar the same points are essential, except that the animal should show masculinity. A strong, broad head and neck, sufficient bone, with strong, straight pasterns, hock, and knee joints, are important. He should show early maturing characteristics, and have well-developed testicles. Shields, or thick plates of skin, should not show on the sides of the shoulder before he is one year of age. A strong, slightly arched back, with large heart girth, is essential in a first-class boar, for he must have room for the vital organs, namely, heart, lungs, etc. Remember that the boar is at least half of the herd as far as breeding is concerned, and he is usually more, so his selection can not command any too much care or patience. Get a good boar and he will pay you well. 27

MANAGEMENT.

BROOD SOW AND LITTER.

The farrowing pen should provide a quiet, safe, and comfortable place for the sow. Light, cleanliness, and freedom from dampness and drafts are essential. A guard rail should be provided to keep the sow from crushing the pigs. 28

Feeding the sow so that she is properly nourished and not overfat is the most important of the herdsman's duties. She should have succulent feeds, such as pasture or forage in summer, and in winter bran or other laxative feeds should be given, so that constipation and fever may be less likely to develop.

At farrowing time no feed except a little bran gruel or oat-meal gruel should be given and only moderately warm water for a few days. A little bran or green feed can then be offered, and as the litter grows and all signs of fever leave, more concentrated feeds may be given. Corn and other heating feeds should be fed in limited quantities for some time, but as the pigs grow and there is more demand on the sow she should be fed liberally. 29

There is no place equal to good pasture for the brood sow and her litter. Alfalfa, clover, rape, oats, rye, vetch, peas, or native pasture afford succulent nutritious feeds which keep both sow and pigs in good condition. Little pigs will learn to eat the forage with the sow at 10 days of age if they have some palatable pasture. 30

Sunlight and clean, dry sleeping pens aid materially in starting the pigs off and in securing rapid, economical growth. 31

View.

32 Feed the sow well and teach the little pigs to eat as soon as possible. Cause both the sow and pigs to take plenty of exercise whether or not on forage or pasture crops.

The dry sow or bred sow should be handled as economically as possible, so they should have pasture and be fed a well-balanced ration and just enough of it to keep them in good condition without permitting them to become fat. As farrowing time approaches the sows should be separated in order to prevent their crowding or injuring one another.

THE HERD BOAR.

The herd boar is best handled by giving him a pasture lot by himself. His feed should be liberal enough to keep him in good breeding condition only. This will be very light when he is not in use for breeding purposes, but during the breeding season his feed should be increased. His ration should consist of some high-protein feeds along with mill feeds and a little corn. The care of the boar is important because of his relative importance in the herd, and his care, quarters, feed, and watering should be carefully seen to and provided.

SHOTES.

33 The term shote is applied to all swine from the time the pig reaches weaning age until the fattening or breeding age is reached. Pigs should be weaned at from 8 to 13 weeks, depending on whether or not the sows are to be bred again. It is always wise to have them taught to eat well before weaning in order that the rate of gain may not be checked. Weaning should be done gradually, the sow's feed being reduced to cause her to dry up properly and at the same time increasing the feed for the pigs. The pig at this age should have a ration rather high in protein and low in carbohydrates.

The boar pigs should be castrated after weaning but before they reach breeding age; usually a week or two after weaning is a satisfactory time. The loss in gains or by death is less if done while the pig is young. Spaying the females is not advisable under modern conditions and will not be found profitable enough to justify the risk of the operation.

COST OF PRODUCTION—FEEDING.

Cost of producing gains in pigs is influenced by a number of factors, chief among which are breeding, feed, water, exercise, shelter, mineral matter, disease, parasites, and environment. Intelligent feeding and sanitation include most of the essentials of success in making the production of pork profitable.

In the first place, however, pork can not be profitably produced by the use of scrub breeding stock. But, given good pigs and careful, cleanly management, with proper feeding, pork production is a safe and profitable business proposition.

View.

There are three general classes of feeding, as follows: Dry-lot feeding; feeding on dairy by-products; and feeding on forage crops. In the following comparisons the rations were considered properly balanced and the cost in each case was fair under the conditions.

The Missouri Experiment Station reports that for five forage crops grown the average grain required to produce 1 pound gain was 3.54 pounds, while five dry-lot experiments required 5.11 pounds grain for 1 pound gain, or a saving of 30.7 per cent of the grain for each pound gain when fed on forage. Gains on forage crops, where \$10 an acre was charged for rent, labor, seed, etc., cost 20 to 30 per cent less than gains made in the dry lot. Corn fed in the dry lots brought 66 cents per bushel, while that fed in forage brought 80 cents per bushel after rent and labor bills were paid. Skinner and Cochel, of the Indiana Experiment Station, state that "skim milk has proven to be the most efficient supplement to shelled corn or corn meal used in the experimental feed lots at the station for the past five years in fattening hogs." Results of numerous experiments seem to show that the best ratio to feed skim milk and corn is 3 to 1 for pigs under 100 pounds and less milk for larger pigs.

By dry-lot feeding is meant feeding in confined pens; pasture means native pasture, as blue grass, etc.; forage crops include alfalfa, and the crops which require to be planted each year; and dairy by-products are skim milk, whey, and buttermilk.

The value of a ration depends on its meeting the needs of the animal to which it is fed. A balanced ration is one in which is supplied enough but not too much food nutrients to supply the needs of an animal for 24 hours.

A ration for a young, growing animal requires a larger percentage of protein than one for fattening or for mature animals. As the shote increases in age and size the protein may be gradually cut down until the standard for a fattening hog is reached. Forage crops have been used more economically as a source of protein than purchased feeds and have the advantage of supplying it in a palatable, succulent form. Alfalfa probably furnishes the cheapest and best forage for swine when it can be grown. Even during winter alfalfa hay can be fed in racks and with ear corn furnishes a well balanced feed for almost all kinds of hogs.

View.

35 Clover, cowpeas, soy beans, peanuts, rape, rye, oats, wheat, vetch, and Canada field peas are all valuable forage crops for swine of any age. The proper grain ration to feed with them consists of such feeds as corn, barley, etc., with the legumes, and with the nonlegume plants the use of a small percentage of tankage and oil meal will be found advisable. The amount to feed will depend on the rate of gain desired. If rapid gains are sought, a full ration of grain should be used; but if economy is more desirable smaller proportions of grain will be better, while if it is only desired to carry the pig crop over a period of low prices they can be kept on a minimum grain ration. It is best, however, to keep them growing, and to do this a small amount of grain, 2 or 3 per cent of live weight, will be found most satisfactory. According to tests at the Missouri station, forage crops proved their value for pork production. The test was continued through three summers, and 10 pounds of gain were accredited to each bushel of corn before gains were accredited to forage crops. Grain was fed at the rate of 2 or 3 per cent of the weight of the hogs. Blue grass produced 295.2; alfalfa, 596.8; clover, 572.2; rape, oats, and clover, 394; sorghum, 370.5; cowpeas, 224.5; soy beans, 183.1; corn, 395.2; and rye grain, 244.3 pounds for each acre pastured. Valuing this pork at 6 cents per pound, alfalfa leads with \$35.71 per acre per year; clover is second with \$34.11, followed by corn, rape, oats, clover, sorghum, blue grass, rye grain, cowpeas, and soy beans. No account was kept of the fertilizing elements left on the ground.

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Dry-lot rations that will give satisfactory returns are not easily obtainable. Corn is most often used as a basis of the ration. Mill feeds, shipstuff, bran, etc., with some protein feed, as alfalfa, tankage, oil meal, soy beans, or cowpeas, should be used to balance the ration. Where milk is available, it can be used to advantage, as noted before. It is best to feed a full ration, or what the pigs will clean up in a reasonably short time when in a dry lot. For a pig weighing 15 to 50 pounds live weight a full ration for one day would be about 6 pounds of grain per 100 pounds weight, and for the larger pigs the ration will continue to grow smaller in proportion to weight until the 300 to 350 pound pig will only consume a daily ration equal to about 2.4 per cent of his weight.

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For feeding on native pasture a smaller percentage of protein is needed than in the dry lot, but some high-protein feed is still needed. Pasture feeding is better than dry-lot feeding under most conditions because it induces exercise and gives succulence to the ration, causing the animals to keep in better

health in this way. Blue-grass pasture is used extensively and is usually considered economical by the farmer. During the early season it is a valuable feed, and if some forage is provided when the blue grass dries up it can be made to produce gains at a very low cost. View.

FEEDING MINERAL MATTER.

Mineral matter should be supplied the herd in the form of hardwood ashes, lime, finely ground rock phosphate, charcoal, and salt. These minerals are of value to the hog in keeping up his health and general vigor of constitution. They are needed to build the framework of the body and to develop young animals. The suckling sow, young pigs, shotes, and the herd boar each profit from eating these substances.

COST IN GAINS FROM BIRTH TO MATURITY.

The little pig makes a pound of gain on less feed than the older pig or grown hog. The amount of grain to each pound of gain increases gradually until maturity. Henry gives the gains in live weight made per week as follows: 7.4 per cent for pigs under 100 pounds; 6 per cent for 100 to 150 pound pigs; 5 per cent for 150 to 200 pound pigs; and decreasing to only 3.1 per cent for 300 to 350 pound hogs.

View 40, taken from a bulletin of the Wisconsin Experiment Station, gives the net gain and the cost of gain per pig from birth to maturity. Note that while the pig gains nearly four times as much, as shown by the first column, during the eighth period of four weeks as during the first four weeks the gain costs about three and one-half times as much per unit gained. The second column shows that it requires \$1.17 worth of feed to produce 100 pounds gain in the first four-week period and \$4.20 to produce 100 pounds gain in the eighth four-week period. This table was made from the records of 86 pigs of Berkshire, Poland-China, and razorback breeding. It shows clearly and accurately the relative cost of gains in young and older pigs and also the relative rapidity with which these gains were made. 40

FARM ECONOMIES WITH SWINE.

The pig's place on the farm can not be filled by any other animal. He is not only a profitable animal when grown as a crop in himself, but some very important places filled by him come from his ability to make use of feeds that would otherwise be lost. Thus he saves waste and utilizes materials around the farm which only he can use and converts these into a marketable product and cash. The pig is known as the

view. "mortgage lifter," and this appellation is certainly well deserved.

Because of the pig's ability to utilize the grain droppings from steers, the pig often makes steer-feeding operations profitable that would not prove so without his aid. Mumford reports in a summary of 10 different experiments that the gains made by pigs following steers paid for from 0.94 per cent to 16.67 per cent of the feed given the steers. These pigs were thrifty shoters and did not receive additional feed.

Considering the relative economy of the different kinds of live stock, the pig takes a place among the most economical. For the whole fattening period the ox requires 1,109 pounds of dry feed to produce 100 pounds gain; the sheep, 912 pounds; and the pig, 420 pounds.

Among the classes of farm animals the pig ranks second as a producer of human food from a given amount of digestible matter consumed. The milch cow leads in her power to convert crops of the field into human food, with the pig second, poultry following, and the steer and sheep coming lowest.

Feeding pigs on the farm has another value, and that is in relation to soil fertility. The man who feeds his grain to pigs sells a very small amount of fertilizing elements off of the farm as compared with the one who sells grain. Furthermore, in using forage or pasture crops the value of the manure scattered over the field is considerable.

Swine farming, like other branches of live-stock farming, gives employment to labor during the entire year and enables the farmer to keep hired labor throughout the year and does not congest it at harvest time. The hog is the only farm animal that can safely harvest the corn crop, and this practice is gaining ground from year to year among the most progressive farmers, resulting in no little saving of labor to the breeder who grows his own corn.

TYPES OF HOGS.

- 41 The lard or fat type of hog is the most common market type in the United States. In conformation he is a compact, thick-bodied hog on rather short legs. He is of a quiet disposition. The butcher desires a hog that will dress well and yield the largest percentage of high-priced cuts of meat. The breeder or feeder should endeavor to supply these, but he must have constitution and feeding capacity to make his operation profitable. From the breeder's or farmer's point of view prolificacy and early maturity are most desirable. Good quality is wanted by both farmer and butcher and is indicated by the fine, silky

hair and smooth, mellow skin. The head should be broad and rather short; neck short and joining the shoulder without creases; jowl full but not flabby; and the shoulder smooth, deep, and well covered. The hog should have a broad, long, straight, or slightly arched back, with a deep, smooth covering of fat. The loin should be broad and strong and level with the back. Hams should be long, deep, thick, and well let down on the hock. The body should be long and deep, the ribs being well sprung and the sides thick and side lines straight. Condition in the fat hog is important from the market standpoint. It is desired to have a thick, even covering of fat over the entire carcass, free from wrinkles or ties. Market demands vary, but a pig of 175 to 300 pounds usually will command ready sale at the best prices.

View.

The bacon type of hog is less common in the United States, but is grown almost exclusively in other countries, especially Denmark. The bacon-type pig is less compact and carries less fat than the fat-type pig. He is characterized by greater length and depth, relatively, and with longer head and lighter ham, shoulder, and jowl. The side is the main point emphasized in the bacon pig, and the shoulder and ham should be light and level with the side. Depth of body with moderate width is sought, and a smooth carcass with firm flesh is desired. The head is longer and the pig stands on longer legs than the lard-type pig. The bacon pig should be marketed at 175 to 200 pounds, and his weight should not be made up of fat, but rather of firm flesh.

42

QUALITY AND CONDITION.

Quality in the pig is indicated by fine hair and small, hard bone; fineness of parts in general indicating high quality. High quality is essential to secure the best market price. The butcher or packer wants a hog that will dress a high percentage of edible meat. This is not secured from a coarse, rough, or poorly fed hog. To secure as much quality as possible and still retain health, vigor, fecundity, and early maturity with good feeding qualities should be the aim of the feeder and breeder. Too fine quality must be carefully avoided, because it is usually accompanied by loss of the best breeding and feeding qualities.

43

Condition in the lard hog is indicated by the covering of fat. The fat should be even and thick over the entire carcass, and free from wrinkles and creases. Condition is desirable because it enhances the value of the hog. Condition in the bacon hog is indicated by a smooth, firm covering of flesh, and deposits

View. of fat are not wanted, but a mixing of fat and lean. There should be no wrinkles or ties in the flesh and the carcass is not wanted thick or heavy.

44 View 44 represents the range in prices by months for mixed packing hogs on the Chicago market in the year 1912. This difference is caused by the quality and condition of the hogs offered for sale by the farmer. As can be seen, there is a difference of more than \$1 per 100 pounds live weight most of the time during the year. If the farmer or breeder would breed for higher quality and feed till his hogs attained a higher finish before sending to market, he could easily change his product from the lower to the higher class. A herd boar that will sire pigs fit to go into the higher class will cost comparatively little more than one that will sire pigs only good enough for the poorer market price, and the good boar will soon pay for his extra cost and return greater profits thereafter.

BREEDS.

In studying, judging, or selecting breeding stock of pure breeding the first thing to remember is breed type. By breed type is meant the characteristics of the particular breed under study. Each breed of swine has a set standard of desirable points as to size, conformation, form, color, and disposition. There are some points in common in nearly all breeds, with enough variation to give one almost any kind of hog desired.

45 The Poland-China is one of the extreme lard, or fat, type. It originated in Ohio, and is the most common breed of hogs in the United States. The Poland-China pig is black or black and white in color; has a short, broad head, with slightly dished face; the ears start strong, but break and drop about one-third of their length. The body is thick, broad, and compact, and deposits of fat are quite thick over the entire carcass. The hams and shoulders are heavy; the back is strong and broad, and its early maturing qualities are remarkably good.

46 The Duroc-Jersey breed originated in the United States. It is a prolific breed and they are good feeders and mature early. The Duroc type of pig is of the fat, or lard, type and it is red in color. The ears are slightly larger and the face longer
47 in some strains than in others, but the best type has ears of moderate fineness and with a rather short, slightly dished, face.

48 Chester White swine, also a United States breed, are of the lard, or fat, type. They have pendent ears and large, long
49 bodies, and reach heavy weights. They are good feeders and breeders. It is a white breed, and only fairly numerous.

The Berkshire breed is of a medium to lard type, having length and depth with less width of body. They have erect ears and strongly dished face. This breed is of English origin and is black, with white feet and a little white in face and on tail, making "six white points."

50

The Large Yorkshire is a white, bacon breed of English origin. A prolific breed and one which attains large size. It is not an early maturing breed to any marked extent, but rather inclined to keep on growing. They have deep, long sides with rather narrow backs. The ears incline to be heavy and droop, but should be fine and not lippy.

51

The Tamworth is a red hog of English origin. They are of the extreme bacon type; good grazers; long in head, leg, and body, but having deep, long sides. The ears are large and erect or leaning forward. Its early maturing qualities are rather inferior, but it is a very prolific breed, and the sows are good mothers.

52

The Hampshire is a hog of the bacon type, and it is usually black, with white belt about the body, but there are some plain black animals. This breed of bacon hogs is of somewhat obscure but undoubtedly American origin. It is very prolific and of medium size. The sides are of moderate length and depth, with rather light shoulders and hams. The quality of Hampshire pork is superior.

53

APPENDIX.

LANTERN SLIDES.

No. of
view.

1. Sow and pigs.
2. Hog house—central type.
3. Ground plan of hog house shown in view 2.
4. Practical central type hog house of moderate cost.
5. Hog house, United States Experiment Farm, Beltsville, Md. Exterior.
6. Hog house, United States Experiment Farm, Beltsville, Md. Interior.
7. Individual pen to show concrete floor with wood overlay.
8. Lovejoy hog cot.
9. Lovejoy type of hog cot in use, St. Clair, Mich.
10. Hog cot at United States Experiment Farm, Beltsville, Md. General view.
11. Hog cot at United States Experiment Farm, Beltsville, Md. Shown open.
12. Hurdles.
13. V-shaped trough.
14. Breeding crate.
15. Device for hauling water.
16. Handcart for hauling water or liquid food.
17. Concrete feeding floor for hogs.
18. Stanchion for ringing.
19. Unsanitary hog house.
20. Keep the house disinfected and sanitary.
21. Dipping vat.
22. The hog louse.
23. One way that hog cholera is spread.
24. Another bad condition.
25. A better way.
26. Poland-China sow in field condition.
27. Duroc-Jersey boar in field condition.
28. Farrowing pen.
29. An unprofitable litter.
30. A good sized profitable litter.
31. Sow and pigs on rape and oats forage.
32. Creep and self feeders for little pigs.
33. Pigs at weaning time on cowpeas.
34. Pigs on oats and pea forage.
35. Pasturing rye.
36. Hogging down corn.
37. Pigs on rape pasture.
38. Rack for feeding alfalfa.
39. Alfalfa rack in use.
40. Table showing average net gain of each pig and average cost of feed for 100 pounds gain from birth to maturity.
41. Champion Berkshire barrows, Iowana Farms, Davenport, Iowa.
42. Champion Tamworth sow—1913—bacon type.
43. Quality pigs.
44. Graphic chart of selling price of pigs on Chicago market.
45. Champion Poland-China sow, "Beauty 2nd," W. J. Baker, Rich Hill, Mo.
46. Duroc-Jersey sow, owned by Wallmeyer Bros., Melbourne, Iowa.
47. Champion Duroc-Jersey boar, "Big Wonder," owned by O. P. Stevens, Ripley, Iowa.

48. Champion Chester White sow, "Myrtle B," owned by Thomas Kent, Walnut, Iowa.
49. Champion Chester White boar, owned by E. D. Summerville, Monroe, Iowa.
50. Berkshire sow.
51. Large Yorkshire sow.
52. Champion Tamworth boar.
53. Hampshire sow, "Pearl's Choice," International 1913.

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FORMULAS.

Formula for kerosene emulsion.—Dissolve $\frac{1}{2}$ pound hard soap in 1 gallon boiling water. Add 2 gallons kerosene and stir for 10 minutes. Dilute to 20 gallons and spray.

Formula for arsenical dip.—A self-boiled arsenical dip recommended by the Bureau of Animal Industry of this department is prepared as follows:

In a 5-gallon metal kettle or pail place 4 pounds of dry granulated caustic soda (not less than 85 per cent pure); add 1 gallon of cold water, and stir with a stick until the caustic soda is practically all dissolved. Have ready 10 pounds of finely powdered white arsenic, and without delay add it in portions of a pound or two at a time, as fast as it can be dissolved without causing the solution to boil, stirring all the time. If the

liquid begins to boil spontaneously, stop stirring and let it cool slightly before adding more arsenic. The secret of success is to work in the arsenic fast enough to keep the solution very hot, nearly but not quite at the boiling point. The result should be a clear solution, except for dirt. If the liquid persistently remains muddy or milky it may be because the operation has been conducted so fast that much water has been boiled out and salts are beginning to crystallize, so add another gallon of water and stir. If the solution does not then clear up, the caustic soda must have been very low grade, and the undissolved substance must be arsenic. In that case put the kettle over the fire, heat nearly but not quite to boiling, and stir. As soon as solution of arsenic is complete, dilute to about 4 gallons, add 10 pounds of sal soda, and stir until dissolved.

Cautions: It is necessary to avoid splashing. Hence never work hurriedly; stir deliberately and regularly; do not dump in the arsenic and sal soda, but carefully slide it in from a grocer's scoop held close to the side of the pail and to the surface of the liquid. Perform the whole operation in a well-ventilated place, and avoid inhaling steam. Have all materials ready to hand before starting. Keep caustic soda tightly closed from air.



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